

Serial No.: 09/702,494

- 2 -

Art Unit: 1725

Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

1. (Currently Amended) A system for precipitating salt comprising:
a column comprising at least one internal element positioned within the column;
a crystallizer in communication with the column;
at least one inlet in communication with the column and the crystallizer; and
at least one salt outlet positioned at the bottom of the crystallizer[[]],
wherein the internal element comprises at least one tray having at least one downward sloping surface.
2. (Cancelled)
3. (Original) The system of claim 1 wherein the crystallizer further includes an agitating-settling system.
4. (Original) The system of claim 3 wherein the agitating-settling system comprises of a partitioned internally circulated system.
5. (Original) The system of claim 1 further comprising a recirculation system in communication with the crystallizer.
6. (Original) The system of claim 5 further comprising at least one reactant inlet in communication with the recirculation system.
7. (Original) The system of claim 3 further comprising a recirculation system in communication with the crystallizer.
8. (Original) The system of claim 7 further comprising at least one mixing slurry tank in communication with the column.
9. (Original) The system of claim 8 wherein the mixing slurry tank further comprises at least one reactant inlet.

740098.1

Serial No.: 09/702,494

- 3 -

Art Unit: 1725

10. (Original) The system of claim 1 wherein the column further includes a vent outlet in communication with a scrubber.
11. (Currently Amended) A system for precipitating sodium metabisulfite comprising:
a crystallizer having at least one sodium metabisulfite outlet;
at least one column in communication with the crystallizer;
at least one internal element positioned within the column; and
at least one sulfur dioxide inlet in communication with at least one of the column and the crystallizer[[]],
wherein the internal element comprises at least one tray having at least one downwardly sloping surface.
12. (Cancelled)
13. (Original) The system of claim 11 wherein the crystallizer further includes an agitation-suspension system.
14. (Original) The system of claim 13 wherein the agitation-suspension system comprises of a partitioned internally circulated system.
15. (Original) The system of claim 11 further comprising a recirculation system in communication with the crystallizer and the column.
16. (Original) The system of claim 15 further comprising a sodium alkali inlet in communication with the recirculation system.
17. (Original) The system of claim 13 further comprising a recirculation system in communication with the crystallizer and the column.
18. (Original) The system of claim 17 further comprising at least one sodium sulfite mixing slurry tank in communication with the column.
19. (Original) The system of claim 18 further comprising a sodium alkali inlet in communication with the sodium sulfite slurry tank.
20. (Original) The system of claim 11 wherein the column further includes a vent outlet in communication with a scrubber.

740098.1

Serial No.: 09/702,494

- 4 -

Art Unit: 1725

21. (Currently Amended) A system for precipitating sodium metabisulfite comprising:
a crystallizer having at least one sodium metabisulfite outlet and an agitation-suspension system;
at least one column in communication with the crystallizer;
at least one internal element positioned within the column;
at least one recirculation system in communication with the crystallizer and the column;
at least one sodium alkali inlet in communication with the recirculation system; and
at least one sulfur dioxide inlet in communication with at least one of the column and the crystallizer[[]],
wherein the internal element comprises at least one tray with at least one downward sloping surface.

22. (Cancelled)

23. (Currently Amended) The system of claim [[22]] 21 having at least one sodium sulfite mixing slurry tank in communication with the column.

24. (Original) The system of claim 23 wherein the column further includes a vent outlet in communication with a scrubber.

25. (Cancelled)

26. (Cancelled)

27. (Cancelled)

28. (Cancelled)

29. (Cancelled)

30. (Cancelled)

31. (Cancelled)

32. (Cancelled)

33. (Currently Amended) A method for producing sodium metabisulfite comprising:
introducing a gas stream comprising sulfur dioxide into a column;
introducing a liquid stream comprising sodium sulfite and water into the column;

740098.1

Serial No.: 09/702,494

- 5 -

Art Unit: 1725

absorbing at least a portion of the sulfur dioxide into the liquid stream;
reacting at least a portion of the sulfur dioxide with at least a portion of the sodium sulfite to produce a sodium metabisulfite stream;
evaporating at least a portion of the water from the liquid stream into the gas stream;
precipitating sodium metabisulfite from the sodium metabisulfite stream in a crystallizer; and
withdrawing a slurry of sodium metabisulfite from the bottom of the crystallizer[[]],
wherein the column and the crystallizer are operated at substantially the same temperature.

34. (Original) The method of claim 33 further comprising agitating a slurry of precipitated sodium metabisulfite with a supernatant.
35. (Original) The method of claim 34 further comprising withdrawing a portion of the supernatant and adding a sodium alkali to at least a portion of the withdrawn supernatant to react with at least a portion of the sodium metabisulfite contained in the supernatant to produce sodium sulfite.
36. (Original) The method of claim 35 further comprising transferring the gas stream containing unreacted sulfur dioxide from the column and introducing it into a scrubber and removing a substantial portion of the unreacted sulfur dioxide.
37. (Original) The method of claim 36 wherein the sodium metabisulfite stream and the supernatant are maintained at about the same pH.
38. (Cancelled)
39. (Currently Amended) The method of claim [[38]] 33 wherein the temperature is at least 25°C.
40. (Original) The method of claim 39 wherein the pH is maintained between 4.0 and 5.0.
41. (Original) The method of claim 40 wherein the precipitated sodium metabisulfite has a purity of at least 98 %.
42. (Original) The method of claim 38 wherein the precipitated sodium metabisulfite has a D₅₀ of at least 180 microns.

740098.1

Serial No.: 09/702,494

- 6 -

Art Unit: 1725

43. (Original) The method of claim 38 wherein the temperature is at least 25°C, the pH is maintained between 4.0 and 5.0, the sodium metabisulfite has a D_{50} of at least 180 microns and a purity of at least 98 %.
44. (Original) The method of claim 43 wherein the temperature is at least 50°C, the pH is maintained between 4.3 and 4.8.
45. (Original) The method of claim 44 wherein the temperature is at least 70°C, the sodium metabisulfite has a D_{50} of at least 300 microns.
46. (Original) A system for precipitating salts comprising:
- a column having at least one internal element;
 - a crystallizer in communication with the column;
 - a recirculation system in communication with the crystallizer and the column;
 - a mixing slurry tank in communication with the recirculation system and the column;
 - at least one gas outlet positioned in the column;
 - at least one salt outlet positioned in the crystallizer;
 - a slurry of salt contained in the crystallizer having a substantially uniform pH;
 - a liquid stream having a first reactant flowing substantially downwardly within the column;
 - a gas stream having a second reactant flowing in the column and substantially countercurrently against the liquid stream;
 - a first feed inlet in communication with the column supplying the first reactant; and
 - a second feed inlet in communication with the mixing slurry tank supplying a third reactant.
47. (Original) The system of claim 46 wherein the salt is sodium metabisulfite, the first reactant is sodium sulfite, the second reactant is sulfur dioxide and the third reactant is a sodium alkali.